iron tubes, bedded in concrete. There are water-tight man-holes at intervals. The electric wires are drawn into the tubes, and the circuits for the lamps, etc., are taken off at the man-holes. Conduits constructed in this manner seem perfectly water-tight.

There are in New York to-day 420 miles of single duct, containing some 4,000 miles of telephone and telegraph wire, and some hundreds of miles of incandescent electric-light conductors. The conduits for high-potential wires are separated from those for telephone and telegraph wires. Up to the present, no arc-lighting company has put its wires under ground, but the Brush Electric Company is going to draw wires into the conduit between 14th and 34th Streets.

Mr. Wheeler then spoke of the present condition of electric circuits in New York, and pointed out the danger of the great number of 'dead wires,'— wires abandoned by the users, and allowed to remain because of the expense of taking them down. These come in contact with electric-light wires, and are a source of danger.

Summing up, Mr. Wheeler stated that the telegraph and telephone problems were practically solved: 4,000 miles of their wires were already under ground, and 12,000 more were to go this fall. The saving in the cost of maintenance is estimated at $100,000 per year. The laying of electric-light wires is not so fully developed; but when the initiative is once taken, the difficulties will be overcome and the undergrounding will become a settled and accomplished fact.

Dr. P. H. Van Der Weyde's paper on 'The Comparative Danger of Alternating *vs.* Direct Current,' is a criticism on the experiments of Mr. H. P. Brown on the danger of alternating currents, which were described and commented on in the last number of *Science*. It is mainly an attack on Mr. Brown's methods of measurement, and it betrays want of acquaintance with Ohm's law and Cardew's voltmeter. "After the lecture I examined the voltmeter, and found, that, according to the statements of Mr. Brown himself, its operation was based upon indications of rise in temperature. Now, it is well known that voltmeters based on this principle are based on false premises; rise of temperature is not produced by electro-motive force, but by amount of current. . . . This is so self-evident that Prof. G. Forbes from England, who last year exhibited . . . a meter for alternating currents, did not think of calling it a voltmeter, because its operation was based on rise of temperature, but he called it a current-meter." Dr. Van Der Weyde's suggestion for measuring the voltage of the current used possesses the charm of novelty. "In order to come to correct conclusions, it would be necessary to measure, by means of indicator-diagrams, the engine-power utilized, and measure the currents obtained by proper instruments, properly used and conscientiously observed." After this is done, the volts are to be calculated by dividing the energy calculated from the indicator-diagrams by the number of ampères.

The paper, in fact, is of the type that brought the ridicule on the association at its early meetings, of which the president complained in his address.

The other papers read will be given in a later issue.

SCIENTIFIC NEWS IN WASHINGTON.

The Army Medical Museum: a Great Object-Lesson for Those who understand its Purpose and System of Arrangement: Interesting Subsidiary Work. — An International Marine Congress: an Important Plan of the United States Hydrographic Office to be carried into Operation. — Disinfectants that destroy the Germicidal Power of Each Other.

The Army Medical Museum.

OF the thousands of people who visit the Army Medical Museum every year, not one per cent, probably, have any clear conception of the object aimed at in gathering and exhibiting a collection of what to most people are disgusting objects. They look upon the museum as a sort of chamber of horrors, placed there for the purpose of giving people an opportunity to gratify a rather depraved curiosity.

But to those who understand that the museum is a great, systematically arranged object-lesson, in which the physical history of man in health and in disease, and at all stages of development, is given and illustrated, it becomes no longer a place in which to gratify a morbid curiosity, but one in which to pursue, under the most favorable circumstances, one of the most fascinating of studies.

The Army Medical Museum, which for many years was housed in the old Ford's Theatre building, the scene of President Lincoln's assassination, was removed last spring from its contracted and inconvenient quarters to a fine new building erected especially for its use and for the accommodation of the medical library. It is near the Smithsonian Institution and National Museum. A smaller building, to be used as a biological laboratory, has since been added, so detached from the main building and so scientifically and thoroughly ventilated as to make it impossible for gases or odors to pass from it into the main building or into the surrounding air. Congress has not yet made an appropriation to pay for fitting up this laboratory, but is expected to do so in one of the bills now pending.

The museum itself is provided with a large, airy, and well-lighted exhibition-hall in the second story of the new building. There is plenty of room to accommodate it for many years to come, although it is at present receiving accessions at the rapid rate of more than five hundred specimens a year, and is now one of the ten largest medical museums in the world. The aggregate amount of money appropriated by Congress for the museum itself, aside from the cost of the building, has been only about fifty thousand dollars. Several of the great museums of Europe have been in existence since the last century, and the great museum in London began with a collection for which one hundred thousand dollars was paid. In consideration of the short time since the museum in Washington was established, and the small amount of money spent upon it, the results are very highly creditable to Dr. Billings, who has charge of it.

In arranging the objects in the museum, the embryology of man as a complete individual in health is first illustrated. The specimens in this department are numerous and very interesting. The embryology of the lower animals is also shown, as far as it throws light upon that of man, but Dr. Billings does not enter deeply into the illustration of the comparative embryology of the lower animals, as that falls not within his province, but in that of the National Museum.

The next step in illustrating the physical history of man is to divide the body into its several parts, and to treat each separately. For instance, the head is first presented in its healthy state. This is shown in all stages of development, from its first appearance in the embryo, with its gradual growth and the appearance of new organs, to its state of development at the period of birth, — in childhood, youth, maturity, and old age. Not only is the head as a whole shown, but the separate organs are also presented in every form, at all ages, and in all their varying conditions. Here, also, corresponding portions of the lower animals are shown, but, as in the former instance, only so far as they illustrate, and assist in understanding, the organs and functions of that particular organ of the human body. Every part of the body is treated in the same systematic way. There is also a case showing remarkable monstrosities in man and animals.

Having treated and shown the body as a whole in its embryology and its anatomy, and all the parts separately, in its healthy, normal conditions, the next series of cases shows the body in disease. The system of treatment is the same as that adopted in illustrating the body in health. Beginning with the body as a whole, in its earliest embryo state, and showing by actual specimens the effect of all diseases to which it is subject, its different great divisions are shown in all known conditions of disease, from the head, when it first appears in the embryo, through all its history, and in all its separate organs, and in every morbid condition to which its various parts and organs are subject, to the lower extremities. Thus the organ and its several parts are shown through their entire life-history whenever modified by disease. The entire series, therefore, includes a representation, by actual anatomical specimens, of the effect of disease upon every organ of the body. By the side of the diseased organs affected by bacteria that have been identified by biological research, such as typhoid-fever, diphtheria, cholera, yellow-fever etc., it is proposed to place the cul-

tures of the disease-germ of each, actually growing on some sterilized nutrient medium.

The last department of this portion of the museum represents the effect of injury of every known kind upon all portions of the human body. The whole museum presents collectively, therefore, a full history of the human body from its very beginning to its end in old age, under all circumstances of health, disease, and injury.

Special work is also being done in the several separate departments of the museum. One of the most important now in progress is the preparation of a series of sections through the human body, made in every possible direction. The object of these, of which similar ones have never before been prepared, is to show the organs of the human body from every possible point of view, thus, in the complete series, exhibiting, as has never been done before, all the minute relations of adjacent organs. The ordinary anatomical specimen, either of the whole body or of a separate organ, only shows this from one direction. This series of sections is being beautifully mounted, and when completed will be of great practical value to physicians and surgeons.

Another department now being arranged will present, when completed, a full collection of all supplies furnished to an army medical hospital. Not only will all drugs and medicines be shown, but all the instruments used, all the books furnished, and every appliance for the care and comfort of the patient. In fact, there will be nothing ever used in a United States army hospital, from an ambulance to the most common drug, that may not there be seen. These are also arranged, as far as possible, in the manner in which they should be kept in an army hospital; so that, in fact, this exhibit becomes a model for all surgeons in actual charge of hospitals. To supplement the collection above described, there will be added those peculiar articles and appliances supplied in foreign countries to their army hospitals, but not at present to be found in one of our own. A fine collection has already been received from Russia, and there will in due time be added similar collections from all other countries.

One of the assistants in the museum is now engaged in mounting for exhibition the collection of medical medals which Dr. Billings has been several years in making. This includes four hundred specimens, from all countries, of medals specially granted to physicians for distinguished services; as, for instance, in great epidemics, and other circumstances in which great and exceptional services have been demanded. These are being uniformly mounted for exhibition in frames. The collection, already a very fine one, is by no means complete, about two hundred more specimens being needed. Dr. Billings hopes gradually to obtain these. The medals are not only interesting in themselves, many of them being very curious, but scores of them have an immensely added value for the interesting history which they suggest.

An International Marine Conference.

The Pilot Chart for September contains the following: —

"An act of Congress, approved by the President July 9, 1888, provided for an international marine conference to secure greater safety for life and property at sea. Invitations have accordingly been extended to each maritime nation to send one or more delegates, to meet in Washington, April 17, 1889. The purposes of the conference are defined as follows: 'To revise and amend the rules, regulations, and practice concerning vessels at sea, and navigation generally, and the "International Code of Flag and Night Signals;" to adopt a uniform system of marine signals, or other means of plainly indicating the direction in which vessels are moving in fog, mist, falling snow, and thick weather, and at night; to compare and discuss the various systems employed for the saving of life and property from shipwreck, for reporting, marking, and removing dangerous wrecks and obstructions to navigation, for designating vessels, for conveying to mariners and persons interested in shipping, warnings of approaching storms, of dangers to navigation, of changes in lights, buoys, and other day and night marks, and other important information; and to formulate and submit for ratification to the governments of all maritime nations proper international regulations for the prevention of collisions and other avoidable marine disasters.'

"'It will be understood by all States taking part in this conference that no questions relating to trade and commerce are within the scope of the discussion, and that, in the disposition of any questions which may be presented to the conference, no State shall be entitled to more than one vote, whatever may be the number of delegates representing it.'

"The importance of this subject is so great, and the need for concerted international action so pressing, that a full attendance of delegates is confidently expected. This office will gladly do all in its power to facilitate the collection and proper presentation of data, and the officers in charge of the various branch hydrographic offices will receive and foward any well-considered suggestions that may be handed to them. It should be remembered, however, that an intimate knowledge of all the conditions of the problem is very necessary to the suggestion or invention of any scheme likely to possess such merit as to render its adoption at all probable, and every plan should be thoroughly considered in all its details before being submitted. In this way the work of the conference itself will be greatly facilitated."

It is only just to say that this most important conference — important not only to mariners and ship-owners, but to every person who intrusts his life or that of his friends, or his property, to the treacherous sea — was conceived, its purposes defined, and its plan perfected, by the United States Hydrographic Office, which also recommended it to Congress in such a way as to induce that unwilling body to make provision for its expenses. It is certain to be a success.

Disinfectants that neutralize Each Other.

Dr. Joseph Holt, formerly president of the New Orleans Board of Health, in a letter on the yellow-fever in Florida, recently published, used this language: "When the sulphurous fumigation is used after the wetting of surfaces with the mercuric solution, 'the sulphurous gas' does not 'unite with the mercuric salt forming a compound which impairs the germicidal power of both,' as declared by Assistant Surgeon J. J. Kinyoun, of the United States Marine Hospital Service, in his recent report on the Louisiana quarantine. That officer was sent here as an expert, and has made a positive statement in regard to a point in chemistry without having taken the trouble to try the experiment. When sulphurous-acid gas or liquid, or sulphuric acid, is added to a solution of the bichloride of mercury, there is absolutely no chemical interchange, but the solution remains perfectly clear. A drop or two of the solution of the iodide of potash will reveal the mercuric element by an abundant precipitation."

This is a very important matter, on account of its practical bearing on the effectiveness of the two agents mentioned, in disinfection, and the results that follow from using one after the other. Dr. Kinyoun has therefore written a reply, from which the following extracts are taken: "As Dr. Holt is a man who wields a large influence in the Southern country in regard to sanitary matters, I think it only a matter of justice to the public to correct the error that Dr. Holt has himself made in stating that the sulphurous fumes do not form an insoluble compound with the mercuric salt, etc.

"In this connection I would respectfully state that the fact had been long known to me, even prior to my inspection of the Louisiana quarantine, that when SO_2 is passed through, or brought in contact with, a solution of bichloride of mercury, a change took place. The mercuric was changed to a mercurous salt; and, observing it during the process of fumigation, I confirmed it before submitting my report. Owing to the want of time, I have not undertaken to find out the exact proportion of the constituents due to the re-action. Suffice it to say that the precipitate is calomel.

"It is apparent, that, if bichloride solution is used prior to sulphur fumigation, the amount of water alone which is present would absorb a great quantity of the gas, and prevent its penetration where the bichloride solution does not reach; and when the change occurs in the solution of bichloride, it is obvious that the germicidal power of both is impaired. When SO_2 is passed through a solution of bichloride containing an equal quantity of ammonia at the temperature of 25° to 40° C., the change takes place slowly; but when the solution or gas is heated to from 40° to 90° C., the change takes place rapidly, converting nearly all the mercuric to a mercurous salt."